DOCUMENT RESUME

ED 200 761 CE 028 540

AUTHOR Stromsdorfer, Ernst W.; Barclay, Suzanne
TITLE Occupational Training in Industry.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE Jun 79
NOTE 59p.; Paper presented at The Workshop on Education and Training Policy: Workplace Perspectives (Washington, DC, June 25-26, 1979). Not available in paper copy due to small print.

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Adults; *Disadvantaged; Employer Attitudes; Employment Practices; *Employment Programs; *Industrial Training; Off the Job Training; *On the Job Training; *Public Policy
IDENTIFIERS *Private Industry

ABSTRACT

A significant amount of on-the-job occupational training is occurring in the private sector, though the data on its extent and nature are extremely sketchy. Estimates of total economic costs in the 1974-75 period range from a crude measure of 100 billion dollars to one that is somewhat more reliable of about 40 to 50 billion dollars. Most of this training appears to be of a general rather than a firm-specific nature, and firms pay some of the costs of this training. The work of some researchers points out that there are significant imperfections in the labor and capital markets which would justify social intervention: i.e., firms have a distinct incentive to hire and train those who have more human capital, who are more efficient learners or both, and social intervention is needed to make it more advantageous for firms to hire and train disadvantaged workers. There is room to apply voucher systems, wage subsidies, or direct rebates on firm's wage bill and other tax incentives to encourage firms to hire and train disadvantaged workers. After almost two decades of experience with employment and training programs, our society is still experimenting with such programs. To improve public policy in this area, the various subsidy and tax schemes should be subjected to classical experimental tests: and more research is needed to see how much private sector occupational training there is, who gets it and who doesn't get it, how it is structured, what it costs, and who pays the cost. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED200761

CE

Occupational Training in Industry

BEST COPY AVAILABLE

by

Ernst W. Stromsdorfer

with the assistance of

Suzanne Barclay

A Paper Prepared for

The Workshop on Education and Training Policy:

Workplace Perspectives

National Institute of Education

Washington, D.C.

June 25-26, 1979

CE028540

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Introduction

This discussion papaer serves two purposes. First, it sets forth the conceptual basis under which training occurs in industry. This involves the consideration of who gains from such training and who pays. It also sets forth the conditions which ensure an optimal quantity and structure of training. Analysis of these factors then provides a rationale (or several rationales) for social intervention in the process of provision of occupational training by private sector firms. Second, the study attempts to quantify the nature and extent of training in industry and the level and distribution of the costs of such training.

To anticipate the conclusions of this paper, we can point out at this time that:

- There are a variety of conditions under which it is socially justified for government to influence the extent and nature of occupational training in industry.
- The existing evidence does not now tell us and is not likely in the near future to inform us as to the optimal nature or extent of social intervention in the process of occupational training in the private sector of industry.
- Even the nature, level and composition of training in private industry, as well as its costs are not well documented or clearly understood. To suggest that the relevant descriptive data, much less data which would allow careful structural analysis, are fragmentary is one of the major understatements of this conference session. But, of course, an appropriate intervention strategy ultimately must be based on the evidence of sound information.

The State of Our Ignorance

Two quotes from practitioners in the field of occupational training in private industry serve to illustrate the general nature of our confusion and ignorance on this subject matter.

Ralph K. Scott argues:

> Businesses today spend large sums of money hiring, replacing and rewarding people, often with little return or even a loss on their investment. Yet, in comparison, relatively little is spent on improving people in their

> professional skills; providing the good performers with a "career path for advancement," or helping the lesser producers strengthen their capabilities for greater achievement. (Scott, 26)

As an interesting contrast, Thomas F. Gilbert asserts that, on the basis of his calcuations:

> It is hard to escape the conclusion that we (the U.S. economy) did, indeed, spend as much as $100 billion on adult training (in industry) in the U.S. in 1975!

Extravagant statements such as the above are not likely to inform social policy. Casual empiricism makes it clear that there is considerable training of many varieties occurring in private industry and that much of it is of economic and social value, otherwise the economy would not have progressed as it has. However, the estimate of 100 billion dollars of occupational training in firms is on the high side to say the least. Seymour Lusterman estimates that the direct costs of private employer training for firms employing 500 or more workers was about two billion in 1975. (Lusterman,14) However, his estimates do not measure all of the opportunity costs involved. In no case, however, is it likely that opportunity costs, foregone wages (or benefits) while training on (or off) company time, approached 98 billion dollars in a year when the return to labor out of 1975 gross national product was approximately 1063 billion dollars. In view of the estimates by Jacob Miner of 13.5 billion dollars of on-the-job training costs in 1958, it is more likely that on-the-job training costs in 1975 were closer to 46 billion if the proportional relationship between on-the-job training in 1975 was the same as in 1958. (Mincer, 17)[1]

---

[1] A rough estimate of the total money value of wage income was made by subtracting interest paid and transfers from disposable personal income. See the Economic Report of the President, January 1979, Table B-8, p. 192.

This ratio could be underestimated for several reasons. The main reasons are two. First, the Mincer estimate itself may underestimate foregone earnings due to on-the-job training. Second, the structure of the economy most surely has changed since 1958. If it has become characterized by a more highly skilled labor force then the proportion of on-the-job training will likely have increased overtime, since higher levels of formal training and skill result in increased on-the-job training.

However, these estimates don't tell us whether these are large or small costs relative to social and economic needs. Nor, do we know if the distribution of occupational training in industry is optimal either from the standpoint of occupation, industry or sociodemographic groups served. And, even though business firms will likely invest in occupational training, or make it available to workers should they wish to undertake it, in quantities and mixes generally consistent with maximizing business profits or survival, there are sufficient imperfections in society and the economy to question whether the existing structure of occupational training in industry is optimal.

In order to answer these questions a more detailed theoretical analysis is required which requires data which will reveal the nature of the underlying economic structure of training in industry. The following sections will first discuss the salient conceptual issues concerning training in industry. Second, available descriptive data on the nature and extent of such training is provided.

Some Theoretical Considerations

What motivates firms to provide training? What conditions dictate the amount of training which will be provided?

Firms provide training since such increases in human capital increase output and add to total profits. They will provide training until the marginal costs of training to the firm equal the marginal costs of training to the firm. Profits can increase either because of increases in the marginal product of labor, part or all of which may be appropriated by the firm or because of complementarities between human and physical capital such that increases in human capital lead to increased returns to physical captial. (Thurow, 28; Becker, 1; Rosen, 23 and 24)

Training is of two types: general and firm-specific. General training raises the productivity of a worker across all firms. Competition among firms results in wages rising along with the rise in labor productivity due to general training. The worker captures all of the increased benefits and so in general no profit-maximizing firm will pay these training costs. The worker pays for such training by reduced earnings during the training period. Apprenticeship training in the classical construction

crafts is the most obvious example of such training. Specific training raises one's productivity only in a given firm where the training occurs. Under a given set of assumptions the firm captures all of the benefits of such training and therefore the worker would be unwilling to bear any of the costs of such training. No other employer will bid for the services of a worker with specific training since such training will not increase the output of any other firm. Wages are not bid up, so the worker does not gain from the investment. On the other hand, the firm providing the training need not compensate the worker who has the increased firm specific human captial since no other firm has an incentive to bid away the worker's services.

There are several real world complications which qualify this simple analysis so that firms may be willing to provide some general training at no cost or reduced cost to the worker and workers may be willing to bear some costs of specific training.

Thurow notes that few types of training are completely specific to any one company and no training within an occupation in a given firm is completely general. In addition, changes in human capital, whether general or specific, are never marginal in a technical sense so that the stock of labor is altered thus raising the returns to physical capital. Also, specific and general human capital can be complementary to each other just as either can be complementary to physical capital. (Thurow, 28) Thus, the real world training environment in a firm is institutionally complex.

Where is there a role for society in this complex situation? Briefly, market imperfections plus the presence of externalities provide justification on efficiency grounds for intervention in the private industrial training process. Of course, equity grounds can always provide a justification for such intervention. Without having to choose whether equity or efficiency grounds are the dominant reason for social intervention in private sector occupational training in industry, it is instructive to list the several efficiency reasons for such intervention. These reasons can be judged to lead to an underinvestment in such training, however, the data we will present later do not necessarily support this contention and, indeed, Mincer's fragmentary work suggests that there may

not be such underinvestment since he estimates relatively high rates of return to the several occupations he analyzes. (Mincer, 17)

The efficiency reasons are as follows:

Externalities. If firms or workers cannot capture all of the gains due to complementaries among human and physical capital investments, it will pay society to subsidize the worker or the firm to increase investment in worker training. Examples exist in situations wherein investment in occupational training in one firm or industry increases output and profits in other firms or industries.

Risk and Uncertainty. Workers, small firms and large firms face different risk and uncertainty premiums. From the firm's standpoint this is due to such factors as the inability (on the part of firms) to control the length of time a worker will stay with a firm, and, hence guarantee the necessary marginal benefits to cover the marginal costs of training. From the worker's standpoint, it is difficult to predict which training is likely to yield appropriate returns. The firm can invest in training with greater ability to estimate and capture returns based on average experience. Large firms can do this more effectively than individuals or small firms.

Imperfections in the Capital Market. Firms are less likely than workers to have difficulty borrowing capital in order to invest in training. Investment funds are fungible and borrowed funds can be used to purchase human or physical assets. This is less so the case for individual workers. However, firms may also experience a relative inability to borrow given human capital investment needs, thus requiring direct capital subsidy. The most dramatic example here lies in the large amount of government subsidy of training undertaken to gear up for World War II production.

Lack of Information. As noted by Thurow, firms may lack knowledge about future or present demand for labor or they may not have information (or cannot acquire it) concerning real or potential shortages. The Sputnik crisis of the Kennedy era comes quickest to mind as an example.

Finally, there are several quasi-efficiency reasons for governmental intervention.

Labor Market Tightness. The degree of demand for labor influences the degree to which a firm can shift the costs of general

training on to the worker. During periods of high unemployment society may wish to subsidize certain types of workers rather than make them bear the relatively higher share of general training cost that may occur as labor markets slacken.

Relative Differences in Human Capital Among Workers. Workers have differing amounts of human capital for a variety of economic or non-economic reasons. Those with relatively more human capital or who are more efficient learners, or both, are more desirable to a firm if they have lower firm training costs or higher productivity when trained. (Rosen, 23) As Thurow notes, "...firms will place a premium on those individuals with the greatest economic ability and those who already possess the most human capital." (Thurow, p. 96) However, it may be in the interests of society to foster the training of those who have low initial human capital or who are not relatively efficient learners. Thus, society may offer subsidies to firms to hire and train such workers. Many programs, the AFDC Work Incentive Program and the National Alliance of Businessmen--Job Opportunities in the Business Sector, are predicated on this (among others) rationale.

Finally, this discussion would not be complete without noting market imperfections which might lead to more occupational training by firms. Briefly, any factor, such as pensions or mobility costs or lack of information on alternative jobs, which reduces a worker's incentive to leave a firm will increase the incentive of the firm to train more since a return on the investment is more assured. In addition, if institutional constraints keep a firm from hiring skilled workers from outside the firm, it will have to train workers within the labor force internal to it. (Thurow, 28)

In summary, there are market imperfections which can lead to increased or decreased occupational training within private sector firms. However, the range of policies to influence the nature and quality of training is explicit. Taxes can be cut to raise the after tax marginal product stream on labor or capital. Subsidies can be used to cut the costs of training, or, less likely, wage policies can be used to hold down the wage stream. Finally, monetary policies can reduce the interest rate and

make more funds available for borrowing. (Thurow, 28)

It is important to note in all this discussion, however, that one may argue for increased social financing of occupational training in industry based on the externality and market imperfections arguments above but this does not necessarily imply direct public investment in such training unless the incentives provided by the above policy instruments fail to increase the quantity, quality or composition of occupational investment in a socially desirable pattern. To make these judgments brings us back again to measuring the state of nature with respect to occupational investment in industry. It is to this that we now turn.

The Nature and Extent of Occupational Training in Industry. Ours is a massive economy with a labor force that exceeds 100 million workers and which is growing. Table 1 shows projected employment in 1985. Over the ten year period from 1976 through 1985 most occupational categories will grow by about one-fifth, which implies an impressive future training need. These training needs are not offset in the strong declines for farm workers and private household workers, who will drop by a combined total of less than three million workers. Table 2 shows these patterns even more clearly. There will be a likely need, for instance, of 6.4 million professional and technical workers. These workers, in addition to their extensive formal institutional training, characteristically have proportionately larger on-the-job training. When one realizes that most past projections of the demand for such workers as engineers have resulted in underestimates, the magnitude of the total training effort takes on interesting dimensions.

Between 1976 and 1985 there will be a projected increase of over 45 million workers. Yet we see from Table 3 that in 1976 combined training in secondary, post-secondary and adult vocational education was only about 15 million individuals. Thus, there is significant room for on-the-job training to occur in the economy.

The data are very sketchy, but we can see from Table 4 that employers account for only about 2.6 million of the 17 million individuals trained in adult education in 1975. Table 5 breaks these data down by

Table 1

Employment by major occupational group, 1976 and projected 1985

(Numbers in thousands)

Occupational group	1976 employment		Projected 1985 employment		Percent change, 1976-85
	Number	Percent	Number	Percent	
Total	87,485	100.0	104,300	100.0	19.2
White-collar workers	43,700	49.9	53,500	51.3	22.4
Professional and technical workers	13,329	15.2	15,800	15.1	18.2
Managers and administrators	9,315	10.6	11,300	10.8	21.0
Sales workers	5,497	6.3	6,400	6.1	16.6
Clerical workers	15,558	17.8	20,000	19.2	28.8
Blue-collar workers	28,958	33.1	34,100	32.7	17.9
Craft and kindred workers	11,278	12.9	13,700	13.2	21.6
Operatives	13,356	15.2	15,600	15.0	16.9
Nonfarm laborers	4,325	4.9	4,800	4.6	11.3
Service workers	12,005	13.7	14,800	14.2	23.4
Private household workers	1,125	1.3	900	.9	-18.8
Other service workers	10,880	12.4	13,900	13.3	27.7
Farm workers	2,822	3.2	1,900	1.8	-34.1

NOTE: Detail may not add to totals because of rounding.

Source: Occupational Projections and Training Data, Table 1, p.5

Table 2

Projected employment and job openings,
by major occupational group, 1976-85

(Numbers in thousands)

Occupational group	1976 employment	Projected 1985 employment	Percent change	Openings, 1976-85		
				Total	Growth	Replacements
Total	87,485	104,300	19.2	45,900	16,800	29,100
White-collar workers	43,700	53,500	22.4	24,800	9,800	15,000
Professional and technical workers	13,329	15,800	18.2	6,400	2,400	3,900
Managers and administrators	9,315	11,300	21.0	5,400	2,000	3,400
Sales workers	5,497	6,400	16.6	3,000	900	2,100
Clerical workers	15,558	20,000	28.8	10,000	4,500	5,500
Blue-collar workers	28,958	34,100	17.9	12,800	5,200	7,700
Craft and kindred workers	11,278	13,700	21.6	5,500	2,400	3,100
Operatives	13,356	15,600	16.9	5,800	2,300	3,500
Nonfarm laborers	4,325	4,800	11.3	1,600	500	1,100
Service workers	12,005	14,800	23.4	8,100	2,800	5,300
Private household workers	1,125	900	-18.8	500	-200	700
Other service workers	10,880	13,900	27.7	7,600	3,000	4,600
Farm workers	2,822	1,900	-34.1	200	-1,000	1,200

NOTE: Detail may not add to totals because of rounding.

Source: Occupational Projections and Training Data, Table 2, p.6

Table 3

Enrollments in public vocational education, by level, fiscal years 1963-76

Fiscal year	Total[1]	Secondary	Post-secondary	Adult
1963	4,217,198	1,950,018	144,060	2,123,122
1964	4,566,390	2,140,756	170,835	2,254,799
1965	[2] 5,430,611	2,819,250	207,201	2,378,522
1966	[2] 6,070,059	3,048,248	442,097	2,530,712
1967	[2] 7,047,501	3,532,823	499,906	2,941,109
1968	[2] 7,533,936	3,842,896	592,970	2,987,070
1969	[2] 7,979,166	4,079,395	706,085	3,050,466
1970	8,793,060	5,114,451	1,013,426	2,666,083
1971	10,495,411	6,494,641	1,140,943	2,859,827
1972	11,602,144	7,231,848	1,304,092	3,066,404
1973	12,072,445	7,353,962	1,349,731	3,368,752
1974	13,555,639	8,433,750	1,572,779	3,549,110
1975	15,340,426	9,426,376	1,889,946	4,024,104
1976	15,133,322	8,860,947	2,202,800	4,069,575

[1] Unduplicated total.

[2] Includes enrollments in special needs programs as follows: 1965, 25,638; 1966, 49,002; 1967, 73,663; 1968, 111,000; 1969, 143,420.

SOURCE: *Summary Data, Vocational Education, Fiscal Years 1963-76* (U.S. Department of Health, Education, and Welfare, Office of Education, Bureau of Occupational and Adult Education).

Table 4

Participants in adult education, by source of instruction: United States, 1969, 1972, and 1975[1]

Source of instruction	Participants[2] (in thousands)			Percent change, 1969 to 1975
	1969	1972	1975	
Total	13,041	15,734	17,059	30.8
4-year colleges or universities	2,831	3,387	3,257	15.0
Employers	2,274	2,613	2,605	14.6
2-year colleges or technical-vocational	[3]1,550	2,361	3,020	94.8
Elementary or secondary schools	[3]1,970	[3]2,200	1,881	−4.5
Community organizations	1,554	1,996	1,784	14.8
Trade, vocational, or business schools	[4]1,504	[4]1,393	1,469	−2.3
Other (labor unions, professional associations, hospitals, tutors, government agencies or correspondence schools)	2,562	3,360	5,511	115.9
Not reported	54	98	71	31.5

[1] Data are for years ending May 1969, May 1972, and May 1975.

[2] Includes persons age 17 and over who were not full-time students in high school or college. Data for 1969 and 1972 also include all persons age 35 and over regardless of their enrollment status.

[3] Data are for public schools only.

[4] Data are for private schools only.

NOTE.—Details do not add to totals because some participants received instruction from more than one source.

SOURCES: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, *Participation in Adult Education, Final Report, 1969; Participation in Adult Education, 1972;* and *Participation in Adult Education, 1975* (in process).

Table 4A

Participants in adult education, by type of program: United States, 1969, 1972, and 1975[1]

Type of Program	Participants[2] (in thousands)			Percent change, 1969 to 1975
	1969	1972	1975	
Total	13,041	15,734	17,059	30.8
General education	3,553	4,074	3,518	-1.0
Occupational training	5,816	7,310	8,307	42.8
Community issues	1,202	1,545	1,699	41.3
Personal and family living	1,580	2,209	2,532	60.3
Social life and recreation	1,552	1,895	2,714	74.9
Other and not reported	572	534	552	-3.5

[1] Data are for years ending May 1969, May 1972, and May 1975.

[2] Includes persons age 17 and over who were not full-time students in high school or college. Data for 1969 and 1972 also include all persons 35 and over regardless of their enrollment status.

NOTE: Details do not add to totals because some participants enrolled in more than one type of program.

SOURCES: Participation in Adult Education, Final Report, 1969; Participation in Adult Education, 1972; and Participation in Adult Education, 1975 (in process). National Center for Education Statistics, U.S. Department of Health, Education, and Welfare.

Table 5

Adult Education--Percent Participation, by Source of Instruction and Description of Course, 1969 to 1975, and by Sex and Race, 1975

[For years ending in May. Covers persons 17 years old and over who were not full-time students in high school or college. 1969 and 1972 include all persons age 35 years old and over regardless of their enrollment status.]

Source of Instruction and Course	1969	1972	1975 Total	1975 Sex		1975 Race		
				Male	Female	White	Black	Other
Total participants	13,041	15,734	17,059	8,028	9,032	15,739	1,031	290
Percent of population participating	10.0	11.3	11.6	11.7	11.6	12.1	6.9	13.4
PERCENT DISTRIBUTION								
Source of instruction:[1]								
Grade schools and high schools	[2]15.1	[2]14.0	11.0	6.5	15.1	11.0	10.5	14.1
Two year colleges and tech. institutes.	[2]11.9	16.3	17.7	17.2	18.1	17.6	20.9	10.7
Four year colleges and universities	21.7	21.4	19.1	16.4	19.7	19.2	19.2	12.4
Community organizations	[2]11.9	12.7	10.5	6.7	13.8	10.8	6.2	4.5
Trade, vocational, and business schools	[2]11.5	[2]11.3	8.6	9.6	7.7	8.2	14.5	12.4
Tutor or private instructor	(4)	(4)	6.9	4.3	9.2	7.2	.8	13.1
Employer	17.4	16.6	15.3	21.4	9.8	15.3	15.1	13.1
Labor unions and professional assns	(4)	(4)	6.1	8.4	4.0	6.3	2.2	8.3
Government agency	(4)	(4)	8.0	6.6	9.3	7.7	9.9	16.2
Other	20.0	22.0	11.7	14.2	9.5	11.9	9.5	11.0
Description of course:[1]								
Occupational training	44.6	46.5	48.7	62.1	36.8	48.7	48.2	50.7
General education	27.2	25.9	20.6	17.6	23.3	19.5	37.4	20.0
Personal and family living	12.1	14.0	14.8	10.3	18.0	15.2	9.4	13.4
Social life and recreation	11.9	12.0	15.9	8.1	22.8	16.6	3.6	20.0
Community issues	9.2	9.8	10.0	10.0	10.0	10.4	5.5	2.4
Other and not reported	4.4	3.4	3.2	3.0	3.4	3.2	2.9	4.5

[1] Percentages total more than 100 since some adults received instruction from more than one source or were enrolled in more than one course.

[2] Public schools only.

[3] Private schools only.

SOURCE: Participation in Adult Education, 1969, 1972, and 1975. U.S. National Center for Education Statistics. U.S. Department of Health, Education and Welfare.

race and sex. In this economy of millions of workers we see from Tables 6 and 7 that thus far, though over 11 billion dollars were spent overall on employment and training programs in 1977, that actual on-the-job training directly subsidized by the federal government accounted for only 51.5 thousand workers in fiscal year 1977. Whether one is thinking in terms of only the unemployed, or a sub-sector of the unemployed, much less when one considers the labor market as a whole, it becomes clear that the role of government is likely to be relatively small in this regard. Even increasing on-the-job training by the 142.3 thousand in the Work Experience category does not change this judgment.

The final estimate we have of adult occupational training is shown in Table 8. For 1975, approximately 8,307 thousand individuals participated in occupational training. This relates to a non-institutional population base in 1975 of 153,449,000 of whom 92,613,000 were in the labor force, either employed or unemployed. Of course, not all of this training occurred in firms and, indeed, this estimate understates the amount of occupational training in firms. Thus, it is very hard to interpret these numbers.

Apprenticeship. Our research revealed that the most detailed basic statistics on occupational training in industry occurs for apprenticeship training. Tables 9, 10, and 11 and Appendix Tables 1, 2,3 and 4 give extensive statistics on apprenticeship in America.

Two observations on apprenticeship training are warranted. First, it is a very small portion of total training in the economy. Apprentices in training at the end of the year represented only .33 of one percent of the labor force in 1950. Total apprenticeship enrollment has fluctuated around this figure for the past three decades. In 1976 it represented .27 of one percent or the labor force. Of course, these workers are in a strategic sector of the economy. This should not be minimized. For instance, in 1976 there were 11,278,000 craft and kindred workers in the economy. Thus, apprenticeships comprised 2.26 percent of this number.

The second observation to make is that this form of training is only minimally influenced by government activity. Given institutional

Table 6

Work and Training Programs--First Time and Current Enrollments, and Obligations, by Program: 1975 to 1977

[First-time enrollments and obligations, for years ending June 30 except as noted. Current enrollment, as of June 30, except, beginning 1977, as of Sept. 30. Covers programs administered by the U.S. Dept. of Labor]

Program	First Time Enrollments (1,000)			Current Enrollments (1,000)			Obligations (mil. dol.)		
	1975	1976	1977	1975	1976	1977	1975	1976	1977[1]
Total	2,762	3,212	4,009	1,148	1,173	1,368	4,109	5,087	11,200
Comprehensive Employment and Training Act (CETA)	2,895	2,761	3,416	926	911	1,004	3,967	4,772	10,756
Training and Work Experience	1,126	1,250	1,423	573	505	367	1,585	1,528	2,266
Public Service Employment	384	488	814	279	300	524	1,541	2,290	7,297
Special Target Groups[2]	70	159	219	53	85	91	229	232	321
Job Corps	46	43	52	21	21	22	210	134	255
Summer Youth Program	716	821	907	(NA)	(NA)	(NA)	391	508	618
Emergency Employment Act[3]	53	(x)	(x)	(NA)	(x)	(x)	11	(x)	(x)
Older Americans Act	7	6	23	5	13	29	12	85	150
Work Incentive Program	360	445	571	217	249	335	130	230	302

NA Not Available X Not applicable

[1] For 15 months, July 1, 1976-Sept. 30, 1977.

[2] Includes Indian, Migrant, and Operation Mainstream programs.

[3] Funds made available to provide for the orderly transition of programs funded under legislation predating the Comprehensive Employment and Training Act. Program discontinued in 1976.

SOURCE: Manpower Report of the President, U.S. Employment and Training Administration, U.S. Dept. of Labor Annual Issues.

Table 7

CETA Activity Under Titles I, II, and VI, Transitional Quarter and Fiscal Year 1977[1]
(Thousands)

Activity	Total		Title I		Title II		Title VI	
	Transitional quarter[2]	Fiscal 1977	Transitional quarter[2]	Fiscal 1977	Transitional quarter[2]	Fiscal 1977	Transitional quarter[2]	Fiscal 1977
Total enrollments		2,361.4		1,415.6		352.9		592.9
New enrollments	520.2	1,715.6	303.5	1,118.9	207.5	164.7	9.2	432.0
Cumulative enrollment by selected program activity:[3]								
Classroom training	100.5	540.5	99.0	536.8	.9	1.8	.6	1.9
On-the-Job Training	14.9	172.9	14.6	164.9	1.8	2.1	.3	5.9
Public service employment	215.1	922.5	8.7	29.7	198.8	334.1	7.6	558.7
Work experience	163.2	588.4	151.2	552.0	12.0	13.3	5.8	23.1
Current enrollment, as of September 30[4]	653.5	890.8	364.4	367.2	245.3	92.4	43.8	431.2
Current enrollment by selected program activity, September 30:[4]								
Classroom training	144.9	162.7	144.1	161.5	.6	.4	0	.8
On-the-job training	35.1	51.5	34.1	48.4	.6	.2	.2	2.9
Public Service employment	287.1	508.2	15.7	8.7	232.0	89.3	39.4	410.2
Work experience	132.4	142.3	116.2	127.8	9.6	1.3	6.6	13.2

[1] New fiscalyear beginning Oct. 1, 1976; transitional quarter covers period of July 1-Sept. 30, 1976.

[2] Data include transfer between titles.

[3] Some enrollees counted in more than one program activity.

[4] As of Sept. 30, 1976, for transitional quarter; Sept. 30, 1977, for fiscal year 1977.

SOURCE: Employment and Training Report of the President, Employment and Training Administration, U.S. Dept of Labor and Office of Human Development, U.S. Dept. of Health, Education, and Welfare, 1978.

Table 8

Participants in adult education, by type of program: United States, 1969, 1972, and 1975[1]

Type of program	Participants[2] (in thousands)			Percent change, 1969 to 1975
	1969	1972	1975	
Total	13,041	15,734	17,059	30.8
General education	3,553	4,074	3,518	−1.0
Occupational training	5,816	7,310	8,307	42.8
Community issues	1,202	1,545	1,699	41.3
Personal and family living	1,580	2,209	2,532	60.3
Social life and recreation	1,552	1,895	2,714	74.9
Other and not reported	572	534	552	−3.5

[1] Data are for years ending May 1969, May 1972, and May 1975.

[2] Includes persons age 17 and over who were not full-time students in high school or college. Data for 1969 and 1972 also include all persons 35 and over regardless of their enrollment status.

NOTE.—Details do not add to totals because some participants enrolled in more than one type of program.

SOURCES U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, *Participation in Adult Education, Final Report, 1969; Participation in Adult Education, 1972;* and *Participation in Adult Education, 1975* (in process).

Table 8A

Participants in adult education, by source of Instruction: United States, 1969, 1972, and 1975[1]

Source of instruction	Participants[2] (in thousands)			Percent change, 1969 to 1975
	1969	1972	1975	
Total	13,041	15,734	17,059	30.8
4-year colleges or universities	2,831	3,367	3,257	15.0
Employers	2,274	2,613	2,605	14.6
2-year colleges or technical-vocational	[3]1,550	2,561	3,020	94.8
Elementary or secondary schools	[3]1,970	[3]2,200	1,881	-4.5
Community organizations	1,554	1,996	1,784	14.8
Trade, vocational, or business schools	[4]1,504	[4]1,393	1,469	-2.3
Other (labor unions, professional associations, hospitals, tutors, government agencies or correspondence schools)	2,552	3,360	5,511	115.9
No reported	54	98	71	31.5

[1]Data are for years ending May 1969, May 1972, and May 1975.

[2]Includes persons age 17 and over who were not full-time students in high school or college. Data for 1969 and 1972 also include all persons age 35 and over regardless of their enrollment status.

[3]Data are for public schools only.

[4]Data are for private schools only.

NOTE: Details do not add to totals because some participants received instruction from more than one source.

SOURCES: Participation in Adult Education, Final Report, 1969; Participation in Adult Education, 1972; and Participation in Adult Education, 1975 (in process). National Center for Education Statistics, U.S. Department of Health, Education, and Welfare.

Table 9

Training Status of Registered Apprentices, 1947-76

Year	In training at beginning of year	Apprentice actions during year			In training at end of year
		New registrations and reinstatements	Completions	Cancellations [1]	
	Total, all trades				
1947	131,217	94,228	7,311	25,190	192,954
1948	192,954	85,918	13,375	35,117	230,380
1949	230,380	66,745	25,045	41,257	230,823
1950	230,823	60,186	28,533	40,747	222,729
1951	222,729	63,881	28,754	56,845	171,011
1952	[2] 172,477	82,842	33,008	43,889	158,522
1953	158,522	73,620	28,561	43,233	160,258
1954	160,258	58,930	27,583	33,139	155,673
1955	158,673	67,285	24,745	28,423	174,722
1956	174,722	74,082	27,231	33,416	188,137
1957	[2] 188,684	80,638	30,350	35,273	185,691
1958	185,691	69,589	30,647	28,918	177,695
1959	177,695	68,220	37,373	40,545	166,026
1960	[2] 172,181	54,100	31,727	33,408	161,128
1961	161,128	69,482	28,547	28,414	155,649
1962	155,649	55,560	23,918	28,434	158,667
1963	158,667	57,204	24,029	28,744	163,318
1964	163,318	59,980	23,744	27,001	170,533
1965	170,533	68,507	24,917	30,168	183,955
1966	183,955	85,031	28,511	34,964	207,511
1967	207,511	97,898	37,290	47,957	220,151
1968	[2] 207,317	111,012	37,287	43,248	237,996
1969	237,996	121,163	39,646	47,581	273,932
1970	[2] 269,628	108,779	46,102	53,810	270,903
1971	[2] 278,431	78,535	42,777	40,891	274,004
1972	[2] 270,404	103,527	53,089	56,750	264,172
1973 [3]	251,085	127,082	43,744	50,150	284,294
1974	[2] 280,985	112,530	46,454	56,292	291,049
1975	[2] 284,562	83,018	45,758	38,226	284,477
1976	[2] 265,647	88,418	49,447	49,650	254,968

[1] Includes voluntary quits, layoffs, discharges, out-of-State transfers, upgrading within certain trades, and suspensions for military service.

[2] The difference from the number in training at the end of the previous year reflects revisions in reporting.

[3] The difference from the number in training at the end of the previous year reflects the new nationwide data system introduced Jan. 1, 1973, as well as revisions in reporting.

Source: Employment and Training Report of the President, 1978, Table F-14, p.320

Table 10

Characteristics of Registered Apprentices in Selected Industries, as of December 31, 1976

Industry	Number of apprentices	Percent distribution[1]								
		Race or ethnic group						Females	Vietnam-era veterans	Other veterans
		White	Black	Oriental	American Indian	Spanish speaking	n.a.e.			
U.S. total	254,988	81.9	9.4	0.4	1.4	4.7	2.1	1.7	31.8	2.1
Agriculture, forestry, fishing	108	77.8	3.7	0	.9	2.8	14.8	.9	38.7	.9
Mining	1,290	73.3	7.0	.2	.3	18.8	.2	1.0	34.3	10.4
Construction:										
Building construction, general contractors	44,937	82.4	9.5	.3	2.7	4.7	.3	.7	22.9	2.4
Construction, special trade contractors	88,290	80.4	10.0	.4	1.5	5.1	2.6	.6	28.2	2.0
Construction, other	4,663	68.2	17.1	.6	2.2	9.2	.8	.8	32.2	2.6
Manufacturing:										
Food and kindred products	2,143	70.6	10.0	.1	.7	7.2	11.3	1.7	41.9	4.2
Printing, publishing, and allied industries	6,900	87.8	7.5	.6	.4	2.0	.6	4.3	37.8	2.1
Chemicals and allied products	3,012	81.3	15.1	.1	.3	2.2	0	2.5	37.5	2.6
Petroleum refinery and related industries	2,736	73.1	18.0	.5	.6	7.6	.2	6.9	32.1	3.9
Rubber and miscellaneous plastics	999	88.8	8.9	0	.3	.9	.1	1.5	34.4	1.9
Stone, clay, glass, and concrete products	1,895	88.4	7.2	.1	.2	2.1	1.0	2.5	33.3	4.4
Primary metal industries	6,472	82.3	8.8	.2	.3	3.9	.5	4.3	31.1	4.0
Fabrication of metal products	10,839	88.8	7.1	.2	.6	2.7	.8	.8	28.2	4.8
Machinery, except electric	9,070	91.1	4.5	.3	.4	2.2	.5	1.1	32.3	2.3
Electric and electronic machines, etc	2,885	90.0	5.6	.3	.7	2.3	1.1	2.9	37.3	1.7
Transportation equipment	8,239	82.9	14.6	.1	.3	1.9	.1	4.2	28.8	2.2
Measuring, analyzing, and controlling instruments	1,788	90.4	4.3	.3	.3	2.3	.3	2.3	32.1	2.9
Miscellaneous manufacturing industries	2,065	90.7	5.0	.6	.3	2.0	1.4	2.7	33.6	4.6
Manufacturing, other	4,065	88.2	5.7	.2	.3	2.7	4.0	2.0	43.6	1.8
Transportation, communication, electricity, gas and sanitation:										
Railroad transportation	3,480	82.1	12.3	.3	.8	3.3	0	.7	31.8	1.4
Electric, gas, and sanitation service	3,463	83.4	5.2	.8	1.4	7.7	.8	.7	45.0	2.7
Other	1,088	90.2	3.7	.5	1.0	1.3	1.3	7.2	35.5	1.8
Wholesale trade	982	78.2	8.3	.3	.3	11.1	1.4	1.0	37.8	2.4
Retail trade:										
Food stores	2,788	78.8	6.6	1.7	1.3	11.3	2.3	8.0	30.2	1.3
Auto dealers and gas service stations	2,122	88.2	4.3	.9	.1	2.7	2.6	.2	38.6	4.0
Retail trade, other	2,062	88.4	5.4	.4	.5	2.0	1.2	4.3	38.9	4.0
Finance, insurance, and real estate	138	78.7	21.0	0	0	2.3	0	5.1	30.9	2.5
Services:										
Auto repair service and garages	6,888	78.2	2.9	1.0	1.2	4.6	11.2	.4	46.2	4.0
Miscellaneous repair service	2,567	88.0	4.3	.3	.6	2.5	3.0	1.3	44.7	7.0
Membership organizations	6,098	82.4	12.1	1.1	.9	4.3	.1	.2	27.1	0
Services, other	5,854	78.4	10.2	1.3	.7	4.7	2.7	15.9	45.9	2.2
Public administration	11,588	82.4	12.9	.3	.6	4.5	18.4	2.5	42.4	4.2
Nonclassifiable establishments	921	85.5	2.6	1.1	1.1	3.1	4.8	2.1	28.2	14.2
Unknown	66	58.6	4.3	0	1.8	8.8	24.6	4.5	31.8	1.5

[1] Percents based only on numbers of apprentices for whom race/ethnic, sex, and veteran status information was reported.

Source: Employment and Training Report of the President, 1978, Table F-15, p. 321

Table 11

Characteristics of Registered Apprentices in Selected Occupations, as of December 31, 1976

Occupation	Number of apprentices	Percent distribution [1]								
		Race or ethnic group						Females	Vietnam veterans	Other veterans
		White	Black	Oriental	American Indian	Spanish speaking	n.e.c.			
U.S. total	284,988	81.9	8.4	0.4	1.4	4.7	2.1	1.7	31.8	2.1
Air-conditioning and refrigeration mechanics	1,778	81.8	5.2	.4	.4	3.8	8.4	.4	47.0	5.2
Aircraft mechanics	388	83.2	4.4	.7	.7	10.9	0	2.9	72.4	8.0
Auto and related mechanics	8,223	78.7	6.1	.8	1.0	4.5	8.0	.3	46.8	4.4
Auto and related body repairers	1,919	81.1	5.0	.8	1.3	5.7	6.1	.2	30.0	3.2
Barbers, beauticians	1,208	78.4	11.8	1.2	.3	4.3	3.1	34.4	22.8	2.1
Bellermakers	3,114	88.2	6.4	.4	1.6	4.2	1.1	.4	28.3	2.1
Bookbinders, bindery workers	733	88.4	6.8	.2	.1	4.7	2.7	18.8	34.2	2.5
Bricklayers, stone and tile setters	4,687	77.8	14.5	.2	1.4	4.6	1.3	.2	22.6	2.2
Butchers, meat cutters	3,783	71.2	9.7	1.2	1.0	12.4	4.8	4.2	28.3	1.7
Cabinetmakers, millers	1,698	78.2	5.6	.4	.3	4.2	11.2	1.0	31.5	3.0
Car repairers	2,834	82.6	12.4	.4	1.2	3.4	0	.7	30.9	1.5
Carpenters	33,457	81.7	8.2	.4	1.6	5.3	2.8	.8	24.2	2.4
Cement masons	2,323	82.9	28.2	.2	2.6	13.5	2.6	.4	22.0	2.1
Compositors	835	88.0	6.3	.4	.6	2.8	1.0	12.2	43.5	2.8
Cooks, bakers	1,567	70.2	18.7	.7	1.1	4.3	4.0	10.6	25.5	3.1
Drafters	988	88.0	6.6	.7	.1	1.9	2.4	4.7	41.1	2.0
Electrical workers, n.e.c.	6,196	84.4	7.6	.4	1.0	2.9	2.6	2.0	46.0	3.4
Electricians	21,135	84.3	8.9	.5	1.3	4.0	.9	.8	28.6	2.7
Electronic technicians	1,581	78.0	9.9	.8	.6	4.1	6.5	8.5	34.5	2.9
Floor coverers	1,187	77.3	7.6	.8	2.6	8.2	2.6	.1	23.7	2.0
Glaziers	1,174	77.3	8.8	.6	1.4	6.0	6.0	.2	21.2	3.3
Industrial technicians, n.e.c.	789	74.4	12.4	.9	1.4	9.8	1.0	10.6	36.2	2.0
Insulation workers	2,202	78.9	11.2	.1	2.6	4.6	2.4	.6	27.5	2.9
Lathers	1,126	71.2	15.6	.2	2.1	8.4	1.3	.3	20.8	2.0
Line erectors, light and power	4,025	88.7	4.9	.5	2.3	4.9	.8	2.2	28.9	2.7
Lithographers, photoengravers	983	88.6	7.0	.3	.3	2.4	.2	2.9	37.1	4.0
Machine setup and operators	1,248	80.6	6.6	.5	4.5	2.7	4.2	.6	44.5	4.8
Machinists	15,237	88.2	7.6	.2	.3	2.7	1.8	1.6	34.2	2.7
Maintenance mechanics	4,636	85.6	8.7	.1	.6	3.0	1.0	2.5	42.5	4.3
Mechanics and repairers, n.e.c.	3,682	84.1	6.3	.3	1.1	2.7	4.3	1.2	44.9	7.2
Medical and dental technicians	748	81.9	8.8	4.0	.4	4.7	.4	8.5	38.3	2.3
Millwrights	4,889	85.4	10.0	.2	1.0	2.4	0	.9	22.3	4.9
Molders, coremakers	596	77.3	8.0	.8	.2	10.7	2.2	.8	22.9	2.5
Office machine servicers	1,873	88.3	11.1	1.1	1.3	4.6	1.6	2.5	42.6	3.8
Operating engineers	4,810	88.1	12.0	.5	4.1	6.6	2.6	.3	21.7	3.3
Optical workers	579	87.3	4.7	.7	1.0	4.9	1.4	7.6	36.2	3.9
Ornamental iron workers	286	73.1	6.0	0	0	7.0	11.9	0	21.1	1.8
Painters	6,087	73.3	13.3	.4	1.7	7.3	2.5	2.4	27.2	2.3
Patternmakers	921	93.5	4.5	.1	0	1.9	0	1.1	23.8	2.9
Pipefitters	13,138	82.7	10.1	.2	1.8	2.0	1.3	1.3	27.5	2.3
Pipefitters, steamfitters	1,048	83.8	12.8	1.0	4.1	4.9	.5	.1	31.1	.3
Plasterers	1,026	61.4	28.3	.4	1.6	12.9	3.4	.4	21.1	1.1
Plumbers	18,560	88.4	8.3	.4	1.1	2.7	1.2	.2	28.2	2.5
Press operators	1,982	87.8	7.0	.4	.6	2.9	.6	1.3	47.5	2.4
Printing and publishing workers, n.e.c.	1,099	88.4	6.2	1.4	.3	3.4	.3	4.8	43.1	1.9
Radio, TV repairers	839	88.0	7.1	.5	.2	2.1	2.1	1.3	26.6	4.0
Roofers	4,049	68.0	15.3	.2	2.5	12.2	1.8	.1	23.9	2.2
Sheet metalworkers	10,733	81.5	10.9	.6	1.1	4.5	1.4	.5	28.7	2.3
Sprinkler fitters	2,567	85.3	7.2	.7	1.1	4.4	1.2	0	23.5	1.8
Stationary engineers	1,618	82.4	11.3	.5	.8	4.7	.1	.9	47.2	4.7
Structural steelworkers	7,877	78.1	11.5	.3	2.5	5.8	1.9	.3	30.6	2.5
Tapers, drywall installers	874	74.5	9.8	1.1	2.3	10.2	1.1	2.5	25.5	2.3
Toolmakers, diemakers	10,905	92.3	4.6	.1	.3	1.9	.5	1.6	25.9	2.3
Miscellaneous trades, n.e.c.	12,227	81.3	10.0	.5	.7	4.3	2.3	4.3	40.4	4.1

[1] Percents based only on numbers of apprentices for whom race/ethnic, sex, and veteran status information was reported.

Source: Employment and Training Report of the President, 1978, Table F-16, p.322

realities it is not likely that there is a large role for government subsidy for this form of training. Indeed, the major government focus has been on equity considerations, specifically with respect to race, ethnic and sex discrimination. The net impact of government activities here has been positive but the total effect is small when one considers the labor force as a whole and the size of the discrimination problem overall.

Economy-wide Estimates of Occupational Training in Industry. Only two studies were discovered which attempt extensive measures of the quantity of occupational training in industry. Extensive contacts with government agencies, private non-profit organizations and computer and library literature searches turned these studies up consistently. Thus, the Bureau of Labor Statistics study of Occupational Training in Selected Metal Working Industries and the Education in Industry study by Seymour Lusterman for the Conference Board are the dominant works in the field. Each date from 1974-75. Thus, they are rapidly becoming obsolete in their ability to inform social policy. We strongly recommend that the methods used by Lusterman be expanded and applied to a regular crossection measure of occupational training in industry for the economy as a whole. In particular, sampling of firms with less than 500 employees (the cut-off in the Lusterman study) is required, even though the economy-wide estimates of industry training may not change significantly. The reason for this is that Lusterman's sample of 2,798 firms was taken from a universe of 7,600 firms which employed about 32 million workers in the sample year, 52 percent of the workers in private non-agricultural employment. Also, these large firms are estimated to perform the majority of occupational training in industry.

The BLS Study. The Bureau of Labor Statistics study results are detailed in Tables 12, 13, 14 and 15. The basic observations to be made are that welders and flame cutters, machinist, and sheetmetal workers comprise 62.7 percent of the total training undertaken. Second, except for transportation equipment, three-fourths to seven-eights of the training by industry category is on-the-job rather than off-production-site training. Finally, when one looks at the occupational detail, about seven-tenths of the training is on-the-job. Only electricians, metal

Table 12

Enrollments and completions: By occupation

(Number and percent distribution of employees in structured training in selected industries[1], 1974)

Occupation	Enrollments		Completions	
	Number	Percent	Number	Percent
Total, selected occupations	133,700	100.0	77,737	100.0
Crane, derrick, and hoist operator	1,964	1.5	1,838	2.4
Electrician	11,398	8.5	6,385	8.2
Electroplater	1,777	1.3	1,109	1.4
Filer, grinder, buffer, etc.	4,123	3.1	2,648	3.4
Layout worker, metal	3,443	2.6	2,452	3.2
Machine tool setter	4,490	3.4	3,481	4.5
Machinist	31,431	23.5	15,447	19.9
Mechanic, maintenance	7,419	5.5	4,112	5.3
Millwright	3,588	2.7	861	1.1
Patternmaker, metal/ wood	1,829	1.4	318	.4
Plumber and/or pipefitter	6,024	4.5	3,066	3.9
Sheet-metal worker	12,138	9.1	8,483	10.9
Tool and die maker	10,250	7.7	2,728	3.5
Welder and flame-cutter	33,827	25.3	24,811	31.9

[1] Fabricated metal products; machinery, except electrical; electrical machinery; and transportation equipment.

NOTE: Because of rounding, sums of individual items may not equal totals.

Source: Occupational Training in Selected Metalworking Industries, Table 2, p.4

Table 13

Enrollments and completions: By occupation and industry

(Percent distribution of employees in structured training, 1974)

Occupation	Enrollments					Completions				
	Total	Fabricated metal products	Machinery except electrical	Electrical machinery	Transportation equipment	Total	Fabricated metal products	Machinery except electrical	Electrical machinery	Transportation equipment
Total, selected occupations	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Crane, derrick, and hoist operator	1.5	3.2	1.4	.9	.6	2.4	4.9	2.6	1.8	.9
Electrician	8.5	5.9	3.3	20.6	12.1	8.2	7.2	1.2	24.2	12.5
Electroplater	1.3	4.4	.2	2.5	.4	1.4	4.2	.3	4.0	.4
Filer, grinder, buffer, etc	3.1	3.6	3.8	1.3	2.8	3.4	3.7	3.9	2.4	3.0
Layout worker, metal	2.8	3.1	1.4	1.0	4.0	3.2	4.2	2.1	1.6	3.9
Machine tool setter	3.4	5.5	2.9	2.9	2.7	4.5	6.8	3.7	3.6	4.2
Machinist	23.5	15.5	42.6	28.7	6.4	19.9	8.1	41.5	26.3	4.5
Mechanic, maintenance	5.5	10.1	6.8	4.5	1.8	5.3	9.7	7.3	2.6	1.6
Millwright	2.7	3.3	1.0	2.1	4.3	1.1	1.1	.3	2.3	1.5
Patternmaker, metal/wood	1.4	.2	3.3	.3	.3	.4	.2	.9	.5	.1
Plumber and/or pipefitter	4.5	2.5	2.4	2.8	8.5	3.9	.3	3.4	1.0	7.1
Sheet-metal worker	9.1	5.0	3.2	11.6	17.0	10.9	4.2	3.4	11.0	21.6
Tool and die maker	7.7	8.5	11.4	12.3	1.8	3.5	3.9	5.8	4.1	1.0
Welder and flamecutter	25.3	29.2	16.5	8.6	37.3	31.9	43.5	23.6	14.4	37.8

NOTE: Because of rounding, sums of individual items may not equal totals.

Source: Occupational Training in Selected Metalworking Industries, Table 4, p.5

Table 14

Enrollments and completions: By type of training and industry

(Number and percent distribution of employees in structured training in selected occupations, 1974)

Industry	Enrollments			Completions		
	Total	On-the-job training	Off-production-site training	Total	On-the-job training	Off-production-site training
	Number					
Total, selected industries	133,700	91,713	41,987	77,737	44,922	32,815
Fabricated metal products	26,667	21,712	4,955	15,642	11,157	4,485
Machinery, except electrical	48,129	37,161	10,968	26,643	17,936	8,708
Electrical machinery	13,588	11,914	1,674	7,019	5,970	1,049
Transportation equipment	45,316	20,925	24,391	28,433	9,860	18,573
	Percent distribution					
Total, selected industries	100.0	68.6	31.4	100.0	57.8	42.2
Fabricated metal products	100.0	81.4	18.6	100.0	71.3	28.7
Machinery, except electrical	100.0	77.2	22.8	100.0	67.3	32.7
Electrical machinery	100.0	87.7	12.3	100.0	85.1	14.9
Transportation equipment	100.0	46.2	53.8	100.0	34.7	65.3

NOTE: Because of rounding, sums of individual items may not equal totals.

Source: Occupational Training in Selected Metalworking Industries, Table 7, p.7

Table 15

Enrollments and completions: By type of training and occupation

(Percent distribution of employees in structured training in selected industries[1], 1974)

Occupation	Enrollments			Completions		
	Total	On-the-job training	Off-production-site training	Total	On-the-job training	Off-production-site training
Total, selected occupations	100.0	68.6	31.4	100.0	57.8	42.2
Crane, derrick, and hoist operator	100.0	92.1	7.9	100.0	92.5	7.5
Electrician	100.0	62.0	38.0	100.0	44.8	55.2
Electroplater	100.0	91.9	8.1	100.0	88.6	11.4
Filer, grinder, buffer, etc.	100.0	91.4	8.7	100.0	89.7	10.2
Layout worker, metal	100.0	52.5	47.5	100.0	47.2	52.8
Machine tool setter	100.0	82.2	17.8	100.0	78.3	21.7
Machinist	100.0	79.2	20.8	100.0	69.5	30.5
Mechanic, maintenance	100.0	83.3	16.7	100.0	74.3	25.7
Millwright	100.0	92.2	7.8	100.0	72.9	26.9
Patternmaker, metal/wood	100.0	90.8	9.2	100.0	86.2	13.8
Plumber and/or pipefitter	100.0	66.5	33.5	100.0	44.5	55.5
Sheet-metal worker	100.0	68.2	31.8	100.0	60.6	39.4
Tool and die maker	100.0	92.7	7.3	100.0	86.9	13.1
Welder and flamecutter	100.0	41.8	58.2	100.0	38.5	61.5

[1] Fabricated metal products; machinery, except electrical; electrical machinery; and transportation equipment.

NOTE: Because of rounding, sums of individual items may not equal totals.

Source: Occupational Training in Selected Metalworking Industries, Table 8, p.7

layout workers, plumbers and pipe fitters, and welders and flame cutters do as much as one-third of their training at off-production site situations. Tool and die makers do only 7.3 percent of their training off the production site. These factors must obviously be considered, along with other institutional realities, when one considers social intervention in these occupational training processes. Thus, wage subsidies and voucher programs would have more relevance to tool and diemaker training, where only 41.8 percent of the training occurs on the job for the industries represented.

Economy-wide Estimates of Education in Industry. By far the best picture of occupational training in industry is presented by the Lusterman study. Firms employing 500 or more workers were sampled and asked to fill out a lengthy questionnaire which detailed the structure and costs of occupational training within the firm. Response rates by firm size ranged from 11 percent for firms having 500-999 employees to 33 percent for firms employing 10,000-49,999 employees. Wholesale and retail firms had only a 10 percent response rate while finance and insurance responded at a 36 percent rate. A follow-up survey was undertaken to discover the nature of non-response bias.

Results: General Focus of Training. According to Lusterman, firm managers view "education and training as subsystems of large systems for assuring the presence of skilled and productive human resources..." These executives and managers "... regard all or most of their companies' education and training activities as legitimate and necessary business functions." (Lusterman, 14, p. 1) The focus in the main is on efficiency and firm needs. However it is interesting to note that both general and firm specific training are provided and that much general training is done on company time, though the exact way in which costs are shared between the worker and the firm is not measured. And, indeed, the basic shortcoming of the study is that foregone earnings are not measured completely. Lusterman quotes one large firm as estimating that 70 to 90 percent of total economic costs is wages or foregone production. Expanding this estimate puts total costs for his sample at between 14 to 18 billion dollars.

Table 16

Prevalence of Education-Training Programs, by Company Size

Company Size	Percent of Companies Reporting Program			
	Tuition Aid (after hours)	Other Outside (during hours)	Company Courses (after hours)	Company Courses (during hours)
10,000 employees or more	97%	90%	56%	96%
5,000 – 9,999	95	83	51	96
2,500 – 4,999	91	79	52	91
1,000 – 2,499	94	77	45	88
500 – 999	82	66	25	71
All companies	89%	94%	39%	58%

Source: Education in Industry, Table 2.1, p.13

Table 17

Percent of Work Force Participating
in Company Courses, by Company Size

Company Size	After Hours	During Hours	Either
10,000 employees or more	2%	12%	14%
5,000 – 9,999	2	13	15
2,500 – 4,999	4	12	16
1,000 – 2,499	4	11	15
500 – 999	2	8	10
All companies	2%	11%	13%

Source: Education in Industry, Table 2.2, p.13

Table 18

Expenditures per Employee for All Education-Training Programs, by Company Size

Dollars per Employee	Total	Company Size (Number of Employees) 10,000 and over	5,000-9,999	2,500-4,999	1,000-2,499	500-999
$ 2.00 and less	4%	10%	8%	6%	3%	3%
2.01 – 5.00	17	5	5	8	20	21
5.01 – 10.00	16	10	4	16	15	19
10.01 – 20.00	21	20	25	20	18	22
20.01 – 40.00	15	14	21	18	13	15
40.01 – 60.00	9	10	16	12	15	3
60.01 – 80.00	8	11	3	11	4	9
80.01 – 100.00	4	4	5	5	5	4
More than $100.00	6	16	13	4	7	4
Total	100%	100%	100%	100%	100%	100%
Median	$16	$20	$28	$20	$17	$13
Mean	60	86	48	32	35	27

Source: Education in Industry, Table 2.3, p.13

The next basic observation is that, similar to the Bureau of Labor Statistics study, about 80 percent of total firm outlays, or $1.6 billion occurred on-the-job, within the firm but not on the job, or both. Only about $400 million was spent to acquire training resources outside of the firm, mainly colleges, universities and proprietary educational firms. It is notable that most of this latter training would appear to be general in nature.

Thus, again, the more appropriate public policy to enhance or influence occupational training in industry may be wage subsidies, vouchers, or tax concessions on educational outlays. It is also clear though that a considerable amount of this training is not entry level or vestibule training. The curriculum comprises "... in-house course programs to prepare employees for supervisory or managerial responsibilities, or to improve or upgrade the skills of those already in such jobs." This occurs in 60 percent of the firms. "Courses in technical and functional skills are only slighly less prevalent" across firms. Such courses, many of which have to be of a general training nature, exhaust 75 percent of direct company expenditures on training.

In training, the firms tend to concentrate on on-the-job training which is both general and firm specific in nature with a heavy bias toward general training. The justification is that of enhancing the efficiency of the firm. With about 13 percent of total employees participating in training in a given year at an average expenditure of about 60 dollars per employee in direct outlays one cannot judge whether there is over or underinvestment from a social standpoint. Hence, it is not clear what policy recommendations should be made from these data. However, some guidance may be gained from the general nature of the training. Writing and computation skills as well as the more obvious craft skills are apparently heavily taught. While these are geared to a company's needs, it is apparently the case that much of this is remedial or upgrading in nature. The employers heavily criticized the public education system for failures in the areas of communications and mathematical preparation.

Thus, one major lesson from the Lusterman study may be that the formal school systems require overhaul and a restructuring of their resources rather than having the society focus in on occupational training in industry <u>per se</u>.

Table 19

Expenditures per Employee for Major Education-Training Programs, by Company Size

Company Size	Outside			In-House (Company)	Total
	Tuition Aid	Other	Total		
10,000 or more employees	$ 5.60	$4.80	$10.40	$67.20	$77.60
5,000 – 9,999	8.30	6.10	14.40	37.50	51.90
2,500 – 4,999	8.10	5.60	13.70	17.20	30.90
1,000 – 2,499	11.50	8.40	19.90	15.60	35.50
500 – 999	5.80	8.50	14.30	12.60	26.90
All companies	$ 6.50	$5.60	$12.10	$48.30	$60.40

Source: Education in Industry, Table 2.4, p.14

Table 20

Expenditures per Employee for Major
Education-Training Programs, by Company Type

Company Type	Outside			In-House	
	Tuition-Aid	Other	Total	(Company)	Total
Manufacturing	$ 5.90	$4.15	$10.05	$49.40	$59.45
Transportation, Communications, Utilities	5.40	6.30	11.70	77.80	89.50
Wholesale and Retail	1.70	2.60	4.30	14.30	18.60
Financial and Insurance	15.60	9.00	24.60	57.50	82.10
Other	5.00	6.90	11.90	14.70	26.60
All companies	$ 6.50	$5.60	$12.10	$48.30	$60.40

Source: Education in Industry, Table 2.9, p.16

Table 21

Distribution of Expenditures Among Major Education-Training Programs, by Company Type

Company Type	Outside			In-House	
	Tuition-Aid	Other	Total	(Company)	Total
Manufacturing	10%	7%	17%	83%	100%
Transportation, Communications, Utilities	6	7	13	87	100
Wholesale and Retail	9	14	23	77	100
Financial and Insurance	19	11	30	70	100
Other	19	26	45	55	100
All companies	11%	9%	20%	80%	100%

Source: Education in Industry, Table 2.10, P.16

Table 22

Percent of Companies Providing Any Courses in Each Course Area, by Company Size

Course Area	Total	10,000 or more Employees	5,000-9,999	2,500-4,999	1,000-2,499	500-999
Management-Supervisory:						
Less than 30 hours only	33%	25%	32%	35%	40%	35%
Some 30 hours or more	27	66	56	37	27	12
Total	60	91	88	82	67	47
Functional-Technical:						
Less than 30 hours only	33	35	42	27	37	30
Some 30 hours or more	21	52	38	29	19	12
Total	54	87	80	56	56	42
Basic Remedial (Total)[1]	8	29	14	14	4	4
All Other (Total)[1]	11	22	17	19	5	10
Any Courses:						
Less than 30 hours only	34	22	26	39	37	34
Some 30 hours or more	36	74	65	47	34	21
Any (Total)	70%	96%	91%	86%	71%	55%

[1] Course-hours breakdown not available.

Source: Education in Industry, Table 6.5, p.49

Table 23

Distribution of Expenditures for Company Courses, by Company Size[1]

	Total	10,000 or more Employees	5,000-9,999	2,500-4,999	1,000-2,499	500-999
Course Area:						
Management-Supervisory	24%	17%	36%	46%	47%	43%
Functional-Technical	74	81	62	50	51	51
Basic Remedial	1	1	1	2	1	3
Other	1	1	1	2	1	3
Total Expenditures	100%	100%	100%	100%	100%	100%
Participants:						
New Employees	10%	14%	15%	12%	8%	9%
Present Employees	90	86	85	88	92	91
Total Expenditures	100%	100%	100%	100%	100%	100%
Expenditures per Employee (mean):	$53.90	$72.00	$44.10	$22.80	$24.00	$19.10

[1] Figures include the cost of courses taken outside the company during working hours as well as inside. Outside expenditures account for about a tenth of the total.

Source: Education in Industry, Table 6.6, p.49

1. Becker, Gary S., "Investment in On-the-Job Training," in Blaug, Mark, editor, Economics of Education 1, Penguin Books, Inc.: Baltimore, MD, 1968. Originally published in Human Capital, Columbia University Press: New York, NY, 1964, Chapter 2.

2. Birnbaum, Howard, "Career Origins On-the-Job Training, and Earnings," Southern Economic Journal, Vol. 42, No. 2, April 1976.

3. Cohen, Alan J., et al. Cooperative Education--A National Assessment Executive Summary Applied Management Sciences, Silver Spring, Md, 1977, ED 148 236

4. The Conference Board, Employing the Disadvantaged: A Company Perspective, New York, NY, 1972.

5. Digest of Education Statistics, 1977-78, National Center for Education Statistics, Department of Health, Education, and Welfare, Washington, D.C.: 1978.

6. Eckaus, R.S., "Comment on Becker's Analysis of On-the-Job Training," in Blaug, Mark, editor, Economics of Education 1, Penguin Books, Inc.: Baltimore, MD, 1968. Originally published in the Journal of Political Economy, Vol. 71, No. 3, 1963.

7. Employment and Training Report of the President, Employment and Training Administration, U.S. Department of Labor and Office of Human Development, U.S. Department of Health, Eduation and Welfare, and Welfare, 1978.

8. Foster, Howard G., "Apprenticeship: Market or Power Forces?," Journal of Human Resources, Vol. VI, No. 2, Spring 1971.

9. Grant, Charles R., Economics of On-the-Job Training: Annotated Bibliography and Literature Review, Air Force Human Resources Laboratory, Lowry Air Froce Base, Colorado Technical Training Division, December 1977, ED 156 903.

10. Gilbert, Thomas F., "Training: The $100 Billion Opportunity," Training and Development Journal, Vol. 30, No. 11, November 1976.

11. Gunderson, Morley, "Impact of Government Training Subsidies," Industrial Relations, Vol. 13, No. 3, October 1974.

12. Holtmann, A.G., and Smith, V.K., "Uncertainty and the Durability of On-the-Job Training," Southern Economic Journal, Vol. 44, No. 1

13. "Largest Firms Spent $2 Billion for Employee Education in 1975," World of Work Report, Vol. 2, No. 8, August 1977.

14. Lusterman, Seymour, Education in Industry, The Conference Board, Inc., New York, NY, 1977.

15. Mattila, John M. and Matilla, J. P., "Construction Apprenticeship in the Detroit Labor Market, " Industrial Relations, Vol. 15, No. 1, February 1976.

16. Matilla, John M. and Matilla, J.P., "Reply to Professor Walsh," Industrial Relations, Vol. 16, No. 3, October 1977.

17. Mincer, Jacob, "On-the-Job Training: Costs, Returns and Some Implications," Journal of Political Economy, Supplement, Vol. LXX, No. 5, Part 2, October 1962.

18. Mincer, Jacob, Schooling, Experience, and Earnings, New York, NY: Columbia University Press, 1974.

19. Piore, Michael J., "On-the-Job Training of Disadvantaged Workers," in Weber, Arnold R., Cassell, Frank M. and Ginsburg, Woodrow L., editors, Public-Private Manpower Policies, Industrial Relations Research Association: Madison, WI, 1969.

20. Occupational Projections and Training Data, Bulletin 2020, Bureau of Labor Statistics, U.S. Department of Labor, April 1979.

21. Occupational Training in Selected Metalworking Industries, 1974, BLS Bulletin 1976, ETA R & D Monograph 53, Bureau of Labor Statistics and the Employment and Training Administration, U.S. Department of Labor, Washington, D.C., 1977.

22. Robison, David, Training and Jobs Programs in Action: Case Studies in Private Sector Initiatives for the Hard-to-Employ, Committee for Economic Development: New York, NY and Work in America Institute: Scarsdale, NY, May 1978.

23. Rosen, Sherwin, "Learning and Experience in the Labor Market," Journal of Human Resources, Vol. VII, No. 3, Summer 1972.

24. Rosen, Sherwin, "Learning by Experience as Joint Production," Quarterly Journal of Economics, Vol. 36, No. 3, 1972.

25. Schiff, Frank W., Training and Jobs for the Hard to Employ: New Directions for a Public-Private Partnership in the United States, Committee for Economic Development: New York, NY, 1978.

26. Scott, Ralph K., "Management's Dilemma: To Train or Not To Train People," Training and Development Journal, Vol. 32, No. 2, February 1978.

27. Stephenson, Robert W. and Burkett, James R., An Action Oriented Review of the On-the-Job Training Literature, American Institutes for Research in the Behavioral Sciences, Washington, D.C., December 1974. ED 110-702

28. Thurow, Lester C., Investment in Human Capital, Belmont, CA: Wadsworth Publishing Co., Inc., 1970.

29. Verespej, Michael A., "Is Training for One Specific Job More Effective?," Industry Week, Vol. 183, No. 8, November 25, 1974.

30. Walsh, William D., "Construction Apprenticeship in the Detroit Labor Market," Industrial Relations, Vol. 16, No. 3, October 1977.

31. Weidman, John C., Employers' Responses to Vouchered On-the-Job Training in the Portland WIN Program, Bureau of Social Science Research, Inc., Washington, D.C., April 1978.

Appendix Table 1

Available training data for occupations generally requiring less than a bachelor's degree

Occupation	Vocational education code	HEGIS code[2]	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Industrial production and related occupations:							
Foundry occupations:							
Patternmakers	17.2302	....	.....	.....	.....	129	.....
Molders	17.2301	....	.....	.....	.....	147	.....
Coremakers	17.2301	....	.....	.....	.....		.....
Machining occupations:							
All-round machinists	17.2302	....	.....	.....	.....	2,526	.....
Machine tool operators	17.2303	....	.....	.....	98	.....	.....
Setup workers (machine tools)	17.2302	....	.....	.....	.....	212	.....
Tool-and-die makers	17.2307	....	.....	(1)	.....	1,901	.....
Printing occupations:[3]	17.1900	5009	17,859	.....	.....	1,374	587
Compositors	17.1908	....	.....	.....	.....	264	.....
Lithographers	17.1902	....	.....	.....	.....	292	.....
Printing press operators and assistants	17.1902	....	.....	.....	292	466	.....
Bookbinders and bindery workers	17.1908	....	.....	.....	18	122	.....
Other industrial production and related occupations:							
Assemblers	.....	....	.....	.....	276	.....	.....
Blue-collar worker supervisors	17.1700	....	12,105	.....	.....	.....	.....
Boilermaking occupations	17.1099	....	.....	.....	.....	508	.....
Furniture upholsterers	17.3500	....	[3]4,336	600	125	.....	.....
Millwrights	17.1099	....	.....	.....	.....	933	.....

See footnotes at end of table.

Appendix Table 1
(continued)

Occupation	Vocational education code	HEGIS code	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Photographic laboratory occupations[4]	17.0900	5007	3,361	.....	.....	.....	810
Stationary engineers	17.3200	....	2,350	.....	.....	288	.....
Welders	17.2306	....	40,840	9,700	1,593	.....	.....
Office occupations:	14.0000	....	[5]587,537	.....	.....	.....	.....
Clerical occupations:	.....	....	.....	.....	[6]2,686	.....	.....
Bookkeeping workers	14.0102	....	.....	.....	76	.....	.....
Cashiers	14.0103	....	.....	.....	92	.....	.....
File clerks	14.0302	....	.....	.....	342	.....	.....
Office machine operators	14.0104	5005	.....	.....	10	.....	.....
Postal clerks	14.0403	....	.....	.....	78	.....	.....
Receptionists	14.0406	....	.....	.....	52	.....	.....
Secretaries and stenographers	14.0700	5005	151,541	33,700	145	.....	[7]19,704
Stock clerks	14.0504	....	.....	.....	190	.....	.....
Typists	14.0900	5005	114,182	6,900	1,123	.....	.....
Computer and related occupations:	14.0200	....	.....	.....	.....	.....	.....
Computer operating personnel	14.0201	5101	10,625	2,600	[8] 282	.....	[8] 4,441
	14.0202	5102	.....	8,400	.....	.....	.....
Programmers	14.0203	0704	9,909	3,200	.....	.....	.....
		5103	.....	.....	.....	.....	2,547
Administrative and related occupations:							
Accountants	.....	5002	.....	.....	.....	.....	9,374
Hotel managers and assistants	.....	0508	3,022	.....	.....	.....	.....
	.....	5010	.....	.....	.....	.....	[9] 1,865
Service occupations:							
Cleaning and related occupations:							
Building custodians	17.1100	....	3,942	([1])	1,077	.....	.....
Hotel housekeepers and assistants	09.0205	....	.....	([1])	.....	.....	.....
Food service occupations:	.....	....	.....	[10] 3,800	.....	.....	.....
Cooks and chefs	17.2902	....	.....	.....	[11]1,717	[11] 548	
Dining room attendants and dishwashers	.....	....	.....	.....	69	.....	.....
Food counter workers	17.2904	....	.....	.....	66	.....	.....
Meatcutters	17.2903	....	.....	.....	121	853	.....
Waiters and waitresses	17.2904	....	.....	.....	69	.....	.....
Personal service occupations:							
Barbers	17.2601	5006	810	5,000	2	[12] 347	.....
Cosmetologists	17.2602	5006	18,309	49,400	87	.....	.....
Funeral directors and embalmers	17.0909	....	111	3,800	.....	.....	.....
Private household service occupations:	09.0200	....	[13]94,247	.....	.....	.....	.....
Private household service workers	09.0201	....	25,669	.....	.....	.....	.....
	09.0202	....	19,740	200	.....	.....	.....
	09.0203	....	34,034	.....	.....	.....	.....
	09.0204	....	5,503	.....	.....	.....	.....
	09.0205	....	2,078	.....	.....	.....	.....
Protective and related service occupations:							
Firefighters	17.2801	5507	.....	.....	.....	.....	3,234
Guards	17.2802	....	.....	.....	6	.....	.....

See footnotes at end of table.

Appendix Table 1
(continued)

Occupation	Vocational education code	HEGIS code	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Police officers[14]	17.2802	5505	.....	100	.....	.....	18,698
Health and regulatory inspectors (government)	17.2899	5408	.....	.....	.....	.....	460
Other service occupations:							
Telephone operators	14.0401	....	.....	.....	25	.....	.....
Education and related occupations:							
Teaching occupations:							
Teacher aides	.....	5503	.....	.....	.....	.....	5,840
Library occupations:							
Library technicians and assistants	14.0499	5504	.....	.....	1	.....	594
Sales occupations:	04.0000	....	[15]221,767	[15] 44,800	.....	.....	[16]19,926
Automobile parts counter workers	04.0300	0509	.....	.....	63	.....	.....
Gasoline service station attendants	04.1600	5004	.....	.....	74	.....	.....
Real estate agents and brokers	04.1700	5004	17,452	21,200	.....	.....	.....
Retail trade sales workers	04.0800	0509	[17]4,955	.....	74	.....	.....
Wholesale trade sales workers	04.0800	0509	2,170	.....	.....	.....	.....
Construction occupations:							
Bricklayers, stonemasons, and marblesetters	17.1004	....	11,468	([1])	671	[18] 1,407	.....
Carpenters	17.1001	....	39,712	200	1,959	6,211	.....
Cement masons and terrazzo workers	17.1099	....	.....	.....	419	566	.....
Construction laborers	17.1099	....	.....	.....	76	.....	.....
Drywall installers and finishers	17.1008	....	.....	.....	.....	195	.....
Electricians (construction)[19]	17.1002	....	15,371	500	604	6,563	
Floor covering installers	17.1099	....	.....	.....	.....	283	.....
Glaziers	17.1099	....	.....	.....	.....	266	.....
Insulation workers	17.1099	....	.....	.....	.....	264	.....
Ironworkers	17.1099	....	.....	.....	.....	2,273	.....
Lathers	17.1006	....	.....	.....	.....	206	.....
Operating engineers (construction machinery operators)	17.100302	...	.....	.....	633	945	.....
Painters and paperhangers	17.1005	....	.....	.....	708	1,139	.....
Plasterers	17.1006	....	.....	.....	202	153	.....
Plumbers and pipefitters[20]	17.1007	....	6,707	100	176	6,061	.....
Roofers	17.1010	....	.....	.....	.....	482	.....
Sheet-metal workers	17.2305	....	4,638	.....	117	2,351	.....
Occupations in transportation activities:							
Air transportation occupations:	17.0400	....	[21]4,143	.....	.....	.....	.....
Airplane mechanics	17.0401	....	.....	1,400	.....	48	.....
Airplane pilots	18.0601	....	433	20,600	.....	.....	.....
Driving occupations:							
Local truck drivers	.....	....	.....	.....	[22]46	.....	.....
Scientific and technical occupations:							
Conservation occupations:							
Forestry technicians	01.0601	5403	.....	.....	175	.....	2,133

See footnotes at end of table.

Appendix Table 1
(continued)

Occupation	Vocational education code	HEGIS code	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Other scientific and technical occupations:							
Drafters	17.1300	5304	29,317	1,900	77	246	.....
Engineering and science technicians	16.0100	5300 5401 5407	28,234	6,000	.....	[23] 354	[24] 46,832
Surveyors	.....	5309	.....	.....	.....	.....	2,219
Mechanics and repairers:							
Other mechanics and repairers:							
Air-conditioning, refrigeration, and heating mechanics	17.0100	5317	14,402	3,100	252	360	.....
Appliance repairers	17.0200	5310	4,663	500	16	.....	.....
Automobile body repairers	17.0301	....	21,307	800	765	266	.....
Automobile mechanics	17.0302	5306	82,656	3,900	1,669	1,343	.....
Business machine repairers[25]	17.0600	5310	941	700	43	567	.....
Computer service technicians	16.0108	5105	.....	.....	.....	.....	188
Diesel mechanics	17.1200	5307	5,316	3,500	137	.....	.....
Farm equipment mechanics	01.0301	....	.....	.....	34	.....	.....
Industrial machinery repairers	17.10031	....	.....	.....	61	920	.....
Maintenance electricians	17.1400	....	.....	100	29	1,106	.....
Television and radio service technicians	17.1503	5310	.....	1,500	33	108	.....
Health occupations:							
Dental occupations:							
Dental assistants	07.0101	5202	5,883	5,000	39	.....	1,425
Dental hygienists	07.0102	5203	1,378	.....	.....	.....	3,538
Dental laboratory technicians	07.0103	5204	844	600	.....	138	622
Medical technologists, technicians, and assistant occupations:							
Electrocardiograph technicians	07.0902	5217	.....	200	28	.....	[26] 66
Electroencephalographic technologists and technicians	07.0901	5217	.....	.....	.....	.....	[26] 66
Medical laboratory workers	07.0200	1223	.....	.....	17	.....	.....
	07.0203	5205	2,953	100	.....	.....	3,313
	07.0299	....	1,768	2,300	.....	.....	.....
Medical record technicians and clerks	14.0499	5213	.....	.....	62	.....	.....
Operating room technicians	07.0305	5211	1,106	.....	.....	.....	252
Optometric assistants	07.0603	5212	.....	.....	.....	.....	519
Radiologic (X-ray) technologists	07.0501	5207	1,847	3,000	.....	.....	3,323
Respiratory therapy workers	07.0903	5215	1,707	.....	5	.....	2,080
Nursing occupations:							
Registered nurses[27]	07.0301	5208	16,740	1,000	.....	.....	34,187
Licensed practical nurses	07.0302	5209	36,759	3,400	66	.....	2,794
Nursing aides, orderlies, and assistants	07.0303	....	29,819	4,100	1,790	.....	.....
Therapy and rehabilitation occups:							
Occupational therapy assistants	07.0401	5210	.....	.....	.....	.....	560
Physical therapist assistants and aides	07.0402	5219	.....	(1)	19		749
Other health occupations:							
Dispensing opticians	07.0601	5212	.....	.....	.....	140	519

See footnotes at end of table.

Appendix Table 1
(continued)

Occupation	Vocational education code	HEGIS code	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Social service occupations:							
Social service aides	.....	5506	.....	.....	.....	.....	3,009
Art, design, and communications-related occupations:							
Design occupations:						-	-
Commercial artists	17.0700	1009	8,049	3,000	8	.....	.....
Photographers	.....	1011	.....	.....	.....	.....	4810

[1] Less than 50 completions.
[2] Includes bookbinders, composing room occupations, lithographic occupations, press operators, and miscellaneous printing occupations.
[3] Includes some upholsterers other than furniture.
[4] May include other photographic occupations.
[5] Includes all persons who completed office occupation programs.
[6] Includes all persons who completed clerical occupation programs.
[7] Includes office machine training.
[8] Includes training for keypunch and other input and peripheral equipment operators, and general data processing workers.
[9] Includes restaurant management.
[10] Includes all persons who completed quantity food preparation programs.
[11] Includes bakers.
[12] Includes beauticians.
[13] Includes all persons who completed private household service occupation programs.
[14] May include some State police officers.
[15] Includes all distribution programs.
[16] Recipients of associate degrees in marketing, distribution, purchasing, business, and industrial management.
[17] Includes training for other occupations in retail trade.
[18] Includes tilesetters.
[19] Training data may include some maintenance electricians.
[20] Includes sprinkler fitters and steamfitters.
[21] Includes all persons who completed air transportation occupation programs.
[22] May include some over-the-road drivers.
[23] Electronics technicians.
[24] Includes an unknown number of workers trained for skilled craft occupations and technical occupations, such as industrial drafters.
[25] May include some computer service technicians.
[26] EEG and EKG technicians combined.
[27] Some graduate may be counted in both junior college and vocational education programs.

Appendix Table 2

Trade	1962	1963	1964	1965	1966	1967[1]	1968[2]	1969[3]	1970	1971	1972	1973	1974	1975	1976
Construction trades:[4]															
Asbestos and insulation workers	–	–	–	–	–	–	–	–	–	312	282	365	295	354	264
Bricklayers, stone and tilesetters	1,527	1,484	1,369	1,342	1,348	1,602	1,206	1,651	1,801	1,431	1,998	1,400	1,184	1,418	1,407
Carpenters	2,986	3,013	2,882	3,272	3,340	4,249	3,423	3,698	3,083	3,639	5,054	5,719	5,211	5,669	6,211
Cement masons	327	312	222	297	293	372	386	300	273	384	825	460	526	564	566
Dry-wall finishers	–	–	–	–	–	–	–	–	–	–	–	446	404	390	195
Electricians	3,279	3,148	3,887	3,327	3,654	6,075	4,742	5,091	5,224	4,364	5,991	5,730	6,138	6,003	6,563
Glaziers	202	201	266	222	239	223	244	217	228	248	335	296	297	337	266
Lathers	387	216	240	268	198	456	290	145	202	188	276	214	278	236	206
Operating engineers	–	–	–	–	–	–	–	–	–	439	1,035	848	829	932	945
Painters	790	895	770	969	807	1,019	868	829	832	992	983	909	1,057	1,148	1,139
Plasterers	290	338	287	181	215	264	201	228	161	161	245	176	183	230	153
Plumbers-pipefitters	3,409	2,924	3,101	3,050	2,736	3,601	3,788	4,888	4,266	4,880	5,255	4,656	5,766	5,560	5,764
Roofers	228	197	282	272	241	379	226	290	278	257	383	426	391	447	482
Sheet-metal workers	1,749	1,558	1,742	1,477	1,568	2,184	2,401	2,544	2,309	2,401	2,768	2,775	2,548	2,302	2,351
Sprinkler fitters	–	–	–	–	–	–	–	–	–	200	408	187	424	449	297
Structural iron workers	896	773	732	870	1,075	1,387	1,209	2,006	1,536	1,381	2,098	1,801	1,513	1,952	2,223
Construction workers not classified above	–	–	–	–	–	–	–	–	1,221	451	552	87	112	115	50
Metalworking trades:															
Boilermakers	58	59	52	111	91	199	135	180	364	405	504	353	367	340	508
Machine set-up and operators	–	–	–	–	–	–	–	–	–	–	–	112	141	144	212
Machinists	1,011	1,330	1,309	1,339	1,516	2,367	2,108	3,527	3,822	3,234	3,695	2,357	2,047	1,905	2,526
Patternmakers	195	150	131	160	150	326	350	395	444	290	275	166	181	158	129
Toolmakers, diemakers	1,339	1,367	1,489	1,293	1,704	3,596	2,502	4,125	4,748	3,482	3,825	2,718	2,051	1,849	1,901
Not classified above	211	227	164	240	446	1,040	690	541	1,673	446	531	–	–	–	–
Graphic art trades:															
Bookbinders	246	453	235	182	160	116	170	315	223	142	231	81	151	159	122
Compositors	869	730	666	675	559	807	810	837	774	623	844	377	442	475	264
Lithographers, photoengravers	399	584	640	329	444	469	325	839	987	320	518	183	587	212	292
Press operators	611	598	551	304	423	517	721	826	637	354	635	507	684	635	466
Not classified above	161	154	175	75	106	164	98	160	279	285	478	307	647	326	230
Miscellaneous trades:[4]															
Air-conditioning and refrigeration mechanics	–	–	–	–	–	–	–	–	–	–	–	153	293	212	360
Aircraft mechanics	–	–	–	–	–	–	–	–	–	149	65	53	36	26	48
Automotive body builders-repairers	154	117	135	133	151	218	214	211	595	307	308	238	310	275	266
Automotive mechanics	559	443	517	334	529	525	705	1,017	641	774	1,269	1,231	1,341	1,297	1,343
Barbers, beauticians	–	–	–	–	–	–	–	–	–	–	–	176	316	315	347
Butchers, meatcutters	401	350	369	448	531	631	756	362	727	817	997	794	919	661	853
Cabinetmakers-millworkers	248	243	213	207	235	177	164	120	186	212	278	241	268	285	294
Car repairers	20	42	13	24	9	77	140	82	101	138	128	174	185	298	290
Cooks, bakers	27	29	34	40	29	22	47	80	91	261	229	105	226	135	548
Dental technicians	25	23	18	32	13	30	59	65	92	78	145	88	117	106	138
Drafters	197	131	128	126	182	243	311	447	538	528	453	273	338	220	246
Electrical workers	339	371	251	277	382	583	591	319	446	1,074	1,691	833	835	778	1,106
Electronic technicians	–	–	–	–	–	–	–	–	–	377	400	163	217	125	354
Floor coverers	–	–	–	–	–	–	–	–	–	316	256	294	300	324	283
Line erectors, light and power	169	183	201	219	238	552	412	617	943	621	586	669	1,159	1,117	1,151
Maintenance mechanics (repairers)	552	439	322	354	442	718	1,072	1,293	1,582	1,253	1,846	774	731	662	920
Millwrights	191	218	251	165	270	780	331	615	763	695	1,080	786	624	794	933
Molders, coremakers	83	106	126	110	112	199	212	281	200	–	–	67	87	123	147
Office machine servicers	–	–	–	–	–	–	–	–	–	–	–	199	387	479	567
Optical workers	43	24	18	24	–	–	–	–	–	–	–	67	153	142	140
Radio and TV repairers	–	–	–	–	–	–	–	–	–	–	–	158	248	222	108
Stationary engineers	73	112	98	181	125	141	75	119	80	–	–	130	168	179	288
Not classified above	–	–	–	–	–	–	–	–	1,447	2,146	3,304	2,182	2,742	2,581	2,985

[1] Figures are understated because detailed data for Florida and Louisiana were not reported.

[2] Figures are understated because detailed data for Florida were not reported.

[3] Figures are understated because detailed data for California and Florida were not reported.

[4] It was not possible to provide a historical series for several trades because they were either recently listed as a separate trade (i.e., moved from a not elsewhere classified category), or were consolidated with one or more related occupations.

NOTE: Dash indicates data not available

SOURCE: U.S. Department of Labor, Bureau of Apprenticeship and Training.

Published source: Occupational Projections and Training Data, Table C-4, p.101

Appendix Table 3

Characteristics of Registered Apprentices in Selected Industries, as of December 31, 1976

Industry	Number of apprentices	Percent distribution [1]								
		Race or ethnic group						Females	Vietnam veterans	Other veterans
		White	Black	Oriental	American Indian	Spanish speaking	n.e.c.			
U.S. total	254,988	81.9	9.4	0.4	1.4	4.7	2.1	1.7	31.8	3.1
Agriculture, forestry, fishing	108	77.8	3.7	0	.9	2.8	14.8	.9	55.7	.9
Mining	1,290	73.3	7.0	.2	.5	18.8	.2	1.0	34.3	10.4
Construction:										
Building construction, general contractors	44,337	82.4	8.5	.3	2.7	4.7	.3	.7	33.2	3.4
Construction, special trade contractors	89,280	80.4	10.0	.4	1.5	5.1	2.6	.6	34.2	2.0
Construction, other	4,683	68.2	17.1	.6	3.2	8.2	.8	.5	31.2	2.6
Manufacturing:										
Food and kindred products	2,143	78.6	10.0	.1	.7	7.2	11.3	1.7	41.2	4.2
Printing, publishing, and allied industries	8,900	87.5	7.5	.6	.4	3.0	.8	3.3	37.8	2.1
Chemicals and allied products	3,012	81.3	15.1	.1	.3	3.2	0	2.5	37.5	3.9
Petroleum refinery and related industries	2,736	73.1	18.0	.5	.6	7.6	.2	6.9	32.1	5.9
Rubber and miscellaneous plastics	990	88.8	9.9	0	.3	.9	.1	1.5	34.4	4.8
Stone, clay, glass, and concrete products	1,868	89.4	7.2	.1	.2	2.1	1.0	2.5	33.3	4.8
Primary metal industries	6,472	82.3	9.8	.2	.3	3.9	.5	1.3	33.1	5.0
Fabrication of metal products	10,830	88.8	7.1	.2	.6	2.7	.8	.8	28.2	3.8
Machinery, except electric	9,070	91.1	4.5	.3	.4	3.2	.5	1.1	32.3	2.3
Electric and electronic machines, etc	2,685	90.0	5.8	.3	.7	2.3	1.1	2.9	37.3	5.7
Transportation equipment	8,292	82.9	14.6	.1	.3	1.9	.1	4.2	28.8	2.2
Measuring, analyzing, and controlling instruments	1,788	90.4	4.3	.3	.3	2.3	.3	3.3	32.1	2.9
Miscellaneous manufacturing industries	2,065	90.7	5.0	.6	.3	2.0	1.4	2.7	33.6	4.3
Manufacturing, other	4,065	85.2	8.7	.2	.3	2.7	4.0	2.0	42.6	3.8
Transportation, communication, electricity, gas and sanitation:										
Railroad transportation	5,400	82.1	13.3	.2	.9	2.3	0	.7	31.8	1.4
Electric, gas, and sanitation service	3,463	88.4	5.2	.6	1.4	7.7	.8	.7	45.0	3.7
Other	1,008	90.2	5.7	.5	1.0	1.3	1.2	7.2	55.5	3.3
Wholesale trade	982	78.2	8.3	.5	.5	11.1	1.4	1.0	37.8	3.4
Retail trade:										
Food stores	2,788	78.8	6.5	1.7	1.3	11.3	2.5	8.0	30.2	1.8
Auto dealers and gas service stations	2,192	88.2	4.3	.9	.1	2.7	2.6	.2	38.6	4.0
Retail trade, other	2,082	84.4	9.4	.4	.5	2.0	1.2	3.2	35.9	4.0
Finance, insurance, and real estate	128	78.7	20.0	0	0	1.3	0	3.1	50.9	3.5
Services:										
Auto repair service and garages	6,802	78.2	3.9	1.0	1.2	4.8	11.2	.4	48.2	4.8
Miscellaneous repair service	2,567	88.0	4.3	.5	.6	2.5	2.0	1.3	64.7	7.0
Motion picture service	6,098	83.4	10.1	1.1	.9	4.5	.1	.2	27.1	0
Membership organizations	3,654	79.4	10.2	1.3	.7	4.7	3.7	15.9	48.9	3.2
Services, other	11,589	82.4	13.9	.3	.8	2.5	10.4	3.5	43.4	4.2
Public administration	921	85.5	3.8	1.1	1.1	3.1	3.8	3.1	29.2	13.2
Nonclassifiable establishments	66	50.8	3.3	0	1.8	3.8	24.6	4.5	30.8	1.5
Unknown										

[1] Percents based only on numbers of apprentices for whom race/ethnic, sex, and veteran status information was reported.

Source: Employment and Training Report of the President, 1978, Table F-15, p.321

Appendix Table 4

Characteristics of Registered Apprentices in Selected Occupations, as of December 31, 1976

Occupation	Number of apprentices	Percent distribution [1]								
		Race or ethnic group						Females	Vietnam veterans	Other veterans
		White	Black	Oriental	American Indian	Spanish speaking	n.e.c.			
U.S. total	254,988	81.9	9.4	0.4	1.4	4.7	2.1	1.7	31.8	3.1
Air-conditioning and refrigeration mechanics	1,778	81.8	5.3	.4	.4	3.8	8.4	.4	47.0	5.2
Aircraft mechanics	389	83.2	4.4	.7	.7	10.9	0	3.9	72.4	9.0
Auto and related mechanics	8,223	78.7	6.1	.8	1.0	4.5	9.0	.3	46.8	4.4
Auto and related body repairers	1,919	81.1	5.0	.8	1.3	3.7	8.1	.2	50.0	3.2
Barbers, beauticians	1,208	78.4	11.8	1.2	.3	4.3	3.1	54.4	22.8	2.1
Boilermakers	3,114	86.2	4.4	.4	1.6	4.2	1.1	.4	29.3	2.1
Bookbinders, bindery workers	733	88.4	6.8	.3	.1	4.7	2.7	16.8	34.9	2.5
Bricklayers, stone and tile setters	4,457	77.8	14.5	.2	1.4	4.6	1.5	.2	23.6	2.2
Butchers, meat cutters	3,763	72.2	9.7	1.3	1.0	13.4	1.6	3.2	32.3	1.7
Cabinetmakers, millers	1,668	78.2	5.8	.4	.3	4.2	11.2	1.9	31.3	3.0
Car repairers	2,934	81.6	13.4	.4	1.2	3.4	0	.7	30.9	1.5
Carpenters	33,437	81.7	8.2	.4	1.6	3.3	2.8	.8	34.2	2.4
Cement masons	2,521	53.9	28.2	.2	2.6	13.5	3.6	.4	22.0	2.1
Compositors	935	88.0	6.3	.4	.6	2.8	1.0	12.2	42.5	2.8
Cooks, bakers	1,567	70.2	18.7	.7	1.1	4.3	4.0	10.6	25.5	3.1
Drafters	893	88.0	4.0	.7	.1	1.9	2.4	5.7	41.1	2.0
Electrical workers, n.e.c.	4,196	84.4	7.6	.4	1.0	2.9	2.6	2.0	45.0	5.4
Electricians	31,135	84.3	8.9	.5	1.3	4.0	.9	.8	29.6	2.7
Electronic technicians	1,581	78.0	8.9	.8	.6	4.1	5.5	8.5	54.5	2.9
Floor coverers	1,187	77.3	7.6	.8	2.6	8.2	2.6	.1	23.7	2.0
Glaziers	1,174	77.3	8.8	.6	1.4	8.0	4.0	.2	31.2	3.2
Industrial technicians, n.e.c.	789	74.4	12.4	.9	1.4	9.8	1.0	10.8	38.2	2.0
Insulation workers	2,202	78.9	11.2	.1	2.8	4.6	2.4	.6	27.5	2.9
Lathers	1,135	71.2	15.6	.2	2.1	8.4	1.5	.3	20.8	2.9
Line erectors, light and power	4,025	86.7	4.9	.5	2.3	4.9	.8	2.2	38.9	2.7
Lithographers, photoengravers	963	89.6	7.0	.3	.5	2.4	.2	3.9	37.1	4.0
Machine setup and operators	1,248	80.6	8.8	.5	4.5	3.7	4.2	.6	44.5	4.8
Machinists	14,237	86.2	7.8	.2	.5	2.7	1.8	1.6	34.3	3.7
Maintenance mechanics	4,626	85.8	8.7	.1	.8	3.0	1.0	2.5	42.5	6.3
Mechanics and repairers, n.e.c.	3,652	84.1	6.5	.3	1.1	3.7	4.3	1.2	48.9	7.2
Medical and dental technicians	749	81.9	8.6	4.0	.4	4.7	.4	9.5	56.3	2.3
Millwrights	4,989	88.4	10.0	.2	1.0	2.4	0	.9	32.3	4.9
Molders, coremakers	306	77.3	8.0	.8	.2	10.7	2.2	.8	23.9	3.5
Office machine servicers	1,875	80.3	11.1	1.1	1.3	4.8	1.6	2.5	62.6	3.8
Operating engineers	4,810	88.1	18.0	.5	4.1	4.6	1.6	.8	33.7	3.3
Optical workers	579	87.3	4.7	.7	1.0	4.9	1.4	7.6	58.2	3.9
Ornamental iron workers	285	73.1	8.0	0	0	7.0	11.9	0	33.1	1.8
Painters	4,067	73.3	12.8	.4	1.7	7.3	2.5	2.4	21.2	2.3
Patternmakers	931	93.5	4.5	.1	0	1.9	0	1.1	25.6	2.9
Pipefitters	13,138	83.7	10.1	.2	1.8	3.0	1.3	1.3	27.5	3.5
Pipefitters, steamfitters	1,048	63.8	19.8	1.0	6.1	8.9	.5	.1	31.1	.3
Plasterers	1,224	81.4	20.3	.4	1.6	12.9	2.4	.4	21.1	1.1
Plumbers	16,850	85.4	8.3	.4	1.1	3.7	1.2	.2	28.2	2.5
Press operators	1,962	87.6	7.0	.4	.8	2.9	.6	1.5	47.5	2.4
Printing and publishing workers, n.e.c.	1,099	88.4	6.2	1.4	.3	3.4	.3	4.8	43.1	1.9
Radio, TV repairers	829	88.0	7.1	.5	.2	2.1	2.1	1.3	60.6	8.0
Roofers	4,249	68.0	15.3	.2	2.5	12.2	1.8	.1	23.9	3.2
Sheet metalworkers	10,753	81.5	10.9	.6	1.1	4.5	1.4	.5	28.7	2.3
Sprinkler fitters	2,357	88.3	7.3	.7	1.1	4.4	1.2	0	23.5	1.8
Stationary engineers	1,618	82.4	11.3	.8	.8	4.7	.1	.9	47.2	4.7
Structural steelworkers	7,677	78.1	11.5	.3	2.5	2.8	1.9	.2	30.8	2.5
Tapers, drywall installers	674	74.5	9.8	1.1	3.3	10.2	1.1	2.5	20.5	3.3
Toolmakers, diemakers	10,908	92.5	4.6	.1	.3	1.9	.5	1.8	25.9	3.3
Miscellaneous trades, n.e.c.	12,227	83.2	10.0	.5	.7	4.3	1.3	4.3	40.4	4.1

[1] Percents based only on numbers of apprentices for whom race/ethnic, sex, and veteran status information was reported.

Appendix Table 5

Distribution of Expenditures Among Major Education Training Programs, by Company Size

Company Size	Outside			In-House (Company)	Total
	Tuition Aid	Other	Total		
10,000 or more employees	7%	6%	13%	87%	100%
5,000 – 9,999	16	12	28	72	100
2,500 – 4,999	26	18	44	56	100
1,000 – 2,499	33	24	57	43	100
500 – 999	22	31	53	47	100
All companies	11%	9%	20%	80%	100%

Source: Education in Industry, Table 2.5, P.14

Appendix Table 6

Prevalence of Education Training Programs, by Company Type

Company Type	Percent of Companies Reporting Program			
	Tuition Aid (after hours)	Other Outside (during hours)	Company Courses (after hours)	Company Courses (during hours)
Manufacturing	92%	75%	36%	64%
Transportation, Communications, Utilities	91	71	54	7[illegible]
Wholesale and Retail	64	51	27	57
Financial and Insurance	96	83	47	90
Other[1]	96	91	43	79
All companies	89%	74%	39%	70%

[1] About three-quarters of the "other" category is made up of three classes of companies: contract construction firms; business service firms — mainly advertising, public relations, management consultant; and companies in the mining industry, including oil and natural gas operations. Prominent among the balance are businesses that offer engineering and architectural consulting and design services.

Source: Education in Industry, Table 2.6, p.14

Appendix Table 7

Percent of Work Force Participating in Company Courses, by Company Type

Company Type	After Hours	During Hours	Either
Manufacturing	2%	5%	7%
Transportation, Communications, Utilities	2	13	15
Wholesale and Retail	1	11	12
Financial and Insurance	3	17	20
Other	4	9	13
All companies	2%	11%	13%

Source: Education in Industry, Table 2.7, p.14

Appendix Table 8

Expenditures per Employee for All Education Training Programs, by Company Type

Dollars per Employee	Total	Manufacturing	Transportation, Communications, Utilities	Wholesale and Retail	Financial and Insurance	All Other
$ 2.00 and less	4%	2%	8%	7%	7%	4%
2.01 – 5.00	17	21	–	27	3	20
5.01 – 10.00	16	24	15	5	4	4
10.01 – 20.00	21	26	10	26	8	20
20.01 – 40.00	15	15	21	12	16	13
40.01 – 80.00	9	6	10	6	15	15
80.01 – 80.00	8	1	18	17	13	6
80.01 – 100.00	4	1	3	–	13	18
More than $100.000	6	4	15	–	21	–
All companies	100%	100%	100%	100%	100%	100%
Median	$16	$11	$36	$19	$56	$21
Mean	60	60	90	19	82	27

Source: Education in Industry, Table 2.8, p.14

Summary and Conclusions

There is a significant amount of on-the-job occupation training in the private sector, though the data on its extent and nature is extremely sketchy.

Estimates of total economic costs in the 1974-75 period range from a crude measure of 100 billion dollars to one that is somewhat more reliable of about 40 to 50 billion dollars. This estimate can be contrasted with CETA Title I outlays of 1,871.4 thousand dollars in FY 1977. The number of workers involved maybe as much as 13 percent of the labor force on an annual basis in 1975. This estimate can be contrasted with CETA Title I enrollments of 1,415,596 in FY 1977. Most of this training is within the firm, either on-the-job or within the plant. Most of it appears to be of a general rather than a firm-specific nature. However, as theory suggests, firms pay some of the costs of this general training. These data whether there is over-or under-investment in training. One has to appeal to economic analysis to gain what little guidance there is on this score. The evidence and guidance, again, is not entirely clear. Mincer's estimates of the rate of return to on-the-job training approach or exceed estimates on the rate of return to private capital. However, the work of Rosen, Becker, Echaus and Thurow all clearly point out that there are significant imperfections in labor and capital markets which would justify social intervention. In particular, firms have a distinct incentive to hire and train those who have more human capital, who are more efficient learners, or both. Thus, for a large class of structurally disadvantaged workers, there is room to apply voucher systems, wage subsidies or direct rebates on a firm's wage bill and other tax incentives to encourage firms to hire and train disadvantaged workers.

After almost two decades of experience with employment and training programs, we can still be said to be a society still experimenting with employment and training programs and various subsidy and tax incentive schemes. Our experience with such programs as WIN vouchers, the with employment and training programs and various subsidy and tax incentive schemes. Our experience with such programs as WIN vouchers, the

WIN tax credit and the National Alliance of Businessmen--Job Opportunities-in-the-Business-Sector has been mixed at best.

There has been room for social intervention but the policy strategy has generally been on the "quick-fix." And, apparently for some types of workers, such as welfare clients, the vouchers and tax credits simply have not been sufficient to encourage large scale employer participation. And for those cases where workers have been drawn into on-the-job training, the estimates of effect are unclear because no study has controlled for self-selection bias, even though the gross results suggests that on-the-job training is a more efficient strategy than institutional training as it is currently structured.

What should be done to improve policy making in this area? First, the various subsidy and tax schemes should be subjected to classical experimental tests. Thus far we have only had the benefit of a series of demonstration projects or actual program evaluations to give impressions of the efficacy of policy. Since we are engaging in programs that sum to several tens of billions of dollars a year (not all of which, however, is training related) it is reasonable to seek more precise answers to the policy questions before us.

Second, though of lesser political and, perhaps analytic, importance, we should attempt to discover more clearly what the state of nature is: How much private sector occupational training is there? What is its structure? Who gets it and <u>who doesn't get it</u>? And, what does it cost and who pays the cost?